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# USAID REGIONAL PROGRAM FOR THE MANAGEMENT OF AQUATIC RESOURCES AND ECONOMIC ALTERNATIVES

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# PLAN FOR THE RECUPERATION AND MANAGEMENT OF THE QUEEN CONCH *Strombus gigas* IN THE GULF OF HONDURAS AND THE BAY ISLANDS

The author's views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government.

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# INTRODUCTION

The Queen Conch, *Strombus gigas* presents a complex management challenge. The preference of conch for shallow waters, easily accessible to divers from the surface and its large obvious shell, means it is a simple, relatively low cost fishery for coastal communities to target.

Conch is also a valuable product. High priced export demand has meant that conch fisheries have grown to become the second most valuable coral reef fishery after spiny lobster in the Caribbean. As such conch plays an important role in underpinning local livelihoods and employment as well as being an important source of hard currency for national economies.

Queen Conch however, has life history traits that make them particularly susceptible to sustained and intensive fisheries exploitation. Their slow growth and late maturity combined with density dependent reproductive success means that sustained fishing pressure can cause crashes in their populations and hinder subsequent population recovery.

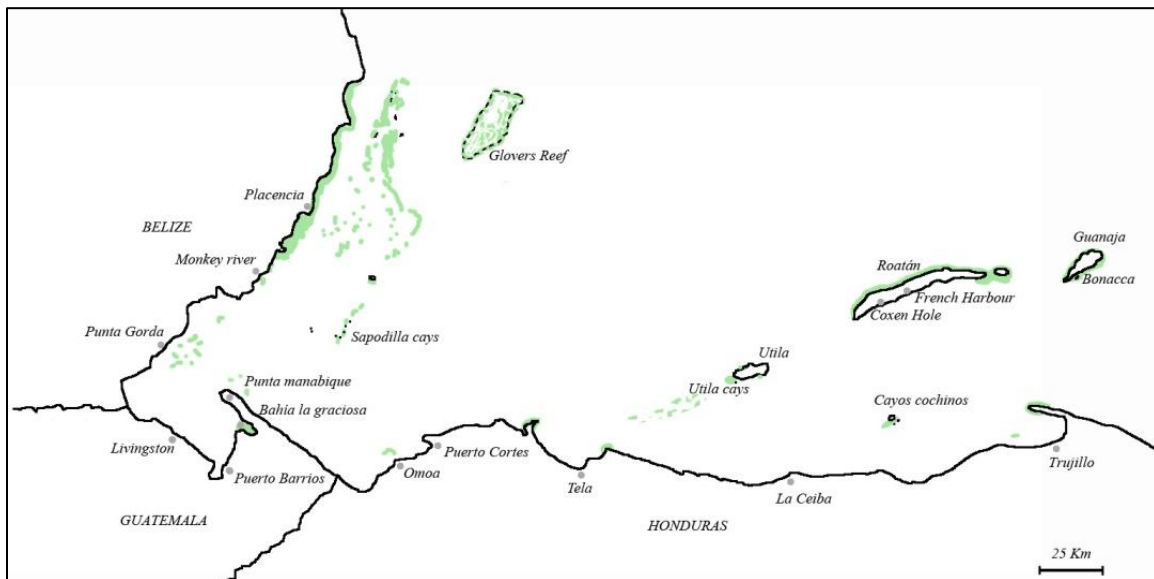
Management of Queen Conch fisheries needs to balance economic gains against the ecological realities maximizing the resource whilst not harming its future potential. This has proven difficult across the region. Conch exploitation in the wider Caribbean was sufficient to place conch on the CITES appendix II in 1992, meaning that whilst not necessarily threatened with extinction, it may become so unless trade is closely controlled. Two significant trade reviews since then triggered by ongoing concerns over sustainability, have continued to find problems with the management of conch at national and regional levels.

For these reasons conch remains the focus of management attention as countries seek to improve their management of marine resources. This has including the growing realization that regional cooperation is fundamental to success in finding sustainable levels of exploitation and recuperating existing stocks, regulating trade levels and implementing effective mechanisms for monitoring and control.

In the Gulf of Honduras, the body of water encompassed by southern Belize, the Guatemalan Caribbean, the north shore of Honduras and the Bay Islands, conch has been and continues to be an important fishery (Map 1). The unequal spatial distribution of conch across this area and the limited individual resources that each country has for control of fishing activities means that significant transboundary fishing activity and trade connection occur that can confound the management efficacy of each country. Although management plans exist for



Belize conch fishery, there is a real need for a framework for tripartite cooperation and joint management across the three countries in respect to conch.



**Map 1 – Locations of the main fishing communities and areas of suitable habitat for queen conch (shaded green) within the Gulf of Honduras and the Bay Islands.**

The current plan for the tri-national management for Queen Conch in the Gulf of Honduras has been based on an extensive review of the current status of exploitation and conservation of conch in each of the three countries in the Gulf region and a series of consultations through participatory workshops and with stakeholders in the region. This work identifies the main problems and issues facing management of conch in the area and provides a series of viable solutions. This plan does not aim to usurp the management of national fisheries and as such is not focused on identifying the control levels that can maintain stock states above its limit, or mortality rates below its limit. Instead this plan aims to compile the solutions proposed by the stakeholders in the region and develop mechanisms, goals and timeframes to achieve these steps through realistic, implementable steps.

In so doing this plan aims to provide the catalyst which can be used to remove some of the barriers limiting management efficacy of the conch fishery in the region and ultimately enhance the productivity of the fishery and its sustainability for the future. In essence the plan looks to address the short-term pressures that are preventing long-term sustainability.

# FISHERY OVERVIEW

## DESCRIPTION OF FISHERY

The conch fishery in the Gulf of Honduras is characterized by small scale fishers that can be divided between the skin diving conch collectors in the waters of southern Belize and the tank divers targeting banks between Utila and Tela Bay in Honduras (Map 1). There are also a small number of subsistence fishers who collect conch incidentally on the limited reef and sea grass areas of Punta Manabique in Guatemala and in the shallow reef areas and seagrass around the Bay Islands.

In the waters of Belize, diving on SCUBA is prohibited for fishing so all conch collection occurs through skin diving. Conch fishing grounds are situated in the shallow (3-5 m) back reef waters that normally contain sea grass, sand and algae. This is the depth range that can be efficiently skin dived, although people can reach down to deeper depths.

The main fishing grounds in the southern portion of Belize that are encompassed by the Gulf of Honduras are around the Sapodilla Cayes and other outer reef banks and seagrass areas as well as around Glover's reef and areas closer in shore in the Port of Honduras Marine Reserve.

The fishery is structured around fishing cooperatives that buy product from their members and process it for export. Once the costs of the operations and overheads are deducted, the cooperative members receive a second payment at the end of the season in proportion to the amount of conch they bought in. Each cooperative receives a government quota which they are entitled to fill over the course of two years. The annual quota is set based on biannual stock assessments conducted by the Belize Fisheries Department with the data used to populate fisheries models and set limits. For the 2010 – 2012 season the quota was set at 764,969 lbs (347 tons) per year with 99% being allocated to two cooperatives (62.1 % to the Northern cooperative and 37% to the National cooperative) and the remaining 1% to the other three from southern Belize (Placencia 0.78%, Caribena 0.07% and Rio Grande 0.07%).

Conch is also caught for domestic consumption in Belize but there are fewer available records for this fishery and the extent and scale of the domestic consumption is poorly quantified. In addition there is a significant extraction of conch by Guatemalan fishers that land the catch in Livingston and Puerto Barrios but are fishing in the territorial waters of Belize. This is estimated to be between 42 and 60 tons annually which is equivalent to 17% of the annual quota. This is currently not accounted for in the total allowable catch set by the Belizean Fisheries Department.

In Honduras the conch fishery is not a targeted fishery across most of the north shore. In western Honduras there are few developed patches of seagrass to support populations for viable exploitation due to the influence of the Ulua river. The only active small scale conch fishers in Honduras are the few communities west of La Ceiba from Porvenir to Tela and on the Island of Utila. The tank divers from these areas can reach banks that are located between 10 and 15 miles off shore between Tela Bay and Utila and contain conch and lobster. As elsewhere, divers are looking for lobster but will collect conch if encountered.

In El Porvenir there are an estimated 8 tank divers using a communal compressor. In the Utila Cays there are around 20 divers who fish for conch and lobster. However there is no information on the total number of divers operating out of the north shore communities or data on the landings by these fishing communities. It is assumed that all fishermen within this fishery will take any size conch they encounter as there is no regulation or control.

Of the subsistence conch fishery around Punta Manabique and the Bay Islands, conch is collected incidentally by fishers accessing reef areas and seagrass from shore or using small canoes. Populations of conch are low across these areas due to sustained exploitation but since juvenile areas are being targeted the effect of these fishers on the wider population structure may be important.

## BIOLOGICAL CHARACTERISTICS OF QUEEN CONCH

The Queen Conch (*Strombus gigas*) is the largest existing species of marine gastropod within the Caribbean Sea, with a maximum shell length of approximately 30 cm (Picture 1). It is also one of the longest living gastropods with estimates that this species can live in excess of 30 years. Conch are found in shallow clear waters, where salinities are similar to oceanic levels, including sand flats, coral rubble, algal plains and seagrass beds.



Picture 1 – The queen conch *Strombus gigas*

Conch form discreet aggregations of a few individuals to many thousands and can be found at depth of 75 m, but are normally found above 30m and in the range of 2-15m. The limiting factor of their distribution is likely to be light which determines the range of some of their preferred habitats and food as seagrass and algae require high light levels for photosynthesis. In clearer waters conch can therefore be found deeper, but where sediments cloud the water they may be restricted only to shallower areas.

Conchs are gonochoristic and so individuals are either male or female and do not change sex during their life. In unexploited populations sex ratios are 1:1. Sexual maturity has normally occurred by the time the lip of the shell is full flared, at 4 around years or 20 cm length but due to the high level of morphological variation, size and flaring are not good determinates of maturity, instead lip thickness is a better indicator, as conch only thicken their shell lip once they have reached maturity.

Conch have a specific reproductive season, which depending on the region and environmental conditions ranges in duration from six to eight months beginning in March and ending in October. Both the day length and water temperature are important cues in the onset of conch reproduction. Peaks in reproductive activity are observed in large expanses of sand at depths of 10-20 m when water temperature is 28-30°C with conch forming aggregations to reproduce.

There is important density dependence in the number of conch in these reproductive aggregations. At low numbers, no spawning is observed. This occurs when conch densities are less than 48 individuals per hectare. Minimal mating behavior begins at densities of 56 indiv.ha<sup>-1</sup>. Reproduction within conch populations is reliant upon a positive feedback loop of copulation and spawning which stimulates reproduction in other individuals, thus increasing a populations reproductive output. This reaches a maximum at 200 indiv.ha<sup>-1</sup>. And suggest that whilst 56 indiv.ha<sup>-1</sup> is the minimum viable population density at reproductive aggregations, 200 indiv.ha<sup>-1</sup> individuals is the density required for a population to be classified as stable.

## ENVIRONMENTAL CHARACTERISTICS

Queen Conch is highly sensitive to the quality of habitat in which they reside. Adult conchs prefer clean, coarse sand or hard bottoms and are not prevalent in soft, silt or clay bottom areas. This explains their limited distribution on the north shore of Honduras and Guatemala where extensive river inputs cause unsuitable benthic type. Changes caused by coastal development which may reduce the extent and quality of their preferred habitat may adversely affect conch populations and distribution.

Similarly juveniles which are found in seagrass beds have important relationships and feedback loops with habitat quality. Juvenile conch prefers intermediate density of seagrass and the grazing action of conch may help maintain this density encouraging further recruitment. Intermediate density provides the optimum benefits in terms of food supply balanced against protection from predators. Predators of juvenile conch cannot hide effectively in intermediate density seagrass making them more susceptible to their own predation pressure.

Changing the density of seagrass either through promoting seagrass growth through nutrification of coastal waters, or reducing density by dredging, reducing light levels or changing current patterns through coastal development may affect populations of juveniles. In addition removing juveniles from seagrass areas may induce a negative feedback loop whereby grazing pressure is reduced, increasing seagrass density and subsequent predation pressure, decreasing survival of the remaining juvenile population. As such seagrass nursery areas need to be protected from the influence of coastal development and from exploitation to maintain conch populations.

Water quality is equally important at all stages of the conch life cycle. Conch larval development is slowed under conditions of low oxygen levels characteristic of nutrification. Exposure to organophosphate pesticides, commonly found in agricultural runoff, can stimulate metamorphosis even in larvae that are not competent to settle, likely reducing their viability. As adults sub lethal exposure to common terrestrial pollutants can cause behavioral and physiological changes reducing growth rates and leaving individuals more prone to predation. High exposure to anthropogenic pollutants is believed to cause reproductive failure, although this is reversible if the conditions are changed.

Maintaining coastal water conditions is thus critical to the management of conch populations as deterioration in water clarity, bottom composition or water quality can all impact conch viability.

## SCOPE OF THE MANAGEMENT PLAN

This plan aims to improve the management of the Queen Conch *Strombus gigas* in the Gulf of Honduras defined geographically as the waters encompassed south from Glover's Reef in Belize across the Caribbean coast of Guatemala and the north shore of Honduras including the Bay Islands and Cayos Cochinos (Map 1).

The overarching objective is to develop strategies that can be implemented by the fisheries departments, fishermen, non-governmental organizations and protected area managers which can conserve existing stocks of conch and assist in the recuperation of conch populations to ultimately enhance the productivity of the conch fishery over the medium to long term.

The plan looks to foster cooperation across the three countries which boarder the Gulf of Honduras, work towards enhancing communication through harmonizing regulation, promoting data sharing and the expansion of control and monitoring

activities. In addition the plan outlines the needs for additional scientific information to assist management activities in the region including cross boarder investigations.

This plan is based on the underlying principles of ecosystem based management, to protect the habitat and ecosystem function that support conch, protect crucial life cycle stages and respect the biological limits of productivity of conch by limiting fishing effort and catch quantities. Further the plan looks to address the human context of the conch fishery in the Gulf of Honduras concerning monitoring and control, addressing illegal unreported and unregulated fishing, tri-national governance, regional trade and the role of CITES. In addition the plan identifies opportunities to develop diversity in coastal resource use to decrease the direct reliance on conch.

## **OPERATION AND REVIEW OF THE MANAGEMENT PLAN**

This plan should form a basis for the resource planning of the conch fisheries in each country in the Gulf of Honduras and promote tri-national governance of conch through tri-national cooperation. The plan should therefore be reviewed and implemented by the fisheries departments of each country, the fishers and fishing groups in each country and the nongovernmental organizations and government departments in charge of marine protected areas for the region.

Each country within the region has specific policies relating to the exploitation of conch. This trinational plan builds on these national policies and sets out additional goals, objectives and mechanisms for a range of connected management strategies to promote regional management. The nature of adaptive management and the national sovereignty of marine areas means that the road map for the implementation of these strategies must be flexible enough to adjust as the process evolves. Actions need to be implemented locally but coordinated regionally taking into account international conventions, most notably the convention on international trade in endangered species (CITES) and the precautionary approach to fisheries laid down in the UN Convention on the Law of the Sea.



# CURRENT MANAGEMENT OF THE FISHERY

## BACKGROUND

There has historically been a very different level of management interest in Queen Conch for each of the three countries in the Gulf of Honduras. In Belize, management plans for conch were established in the 1974 following dramatic declines in the conch populations and a crash in the production of the fishery. Since then the Belize Fisheries Department has continued to evolve its fisheries monitoring and evaluation procedures and develop comprehensive legislation backed by a range of enforcement mechanisms. Belize currently leads the three countries in the extent of its legislation and its ability to monitor and control its commercial small scale fishing activities.

**Table 1 - Current legislation detailing the regulations governing the fishing of queen conch in each of the countries of the Gulf of Honduras.**

	<b>Belize</b>	<b>Guatemala</b>	<b>Honduras</b>
Fisheries law	Regulation No. 6 of chapter 210s of the Belize laws Revised 2000	Ministerial Agreement SG-0059-2010 Article 2	General Fishing law, 1959 and, Agreement 002-2011, 6 <sup>th</sup> January 2011
Minimum Shell length	178 mm	X	X
Minimum clean meat weight (90%)	3 oz	X	X
Minimum clean meat weight (100%)	2.75 oz	X	X
Minimum Lip thickness	X	X	X
Gear Restrictions	Cannot use SCUBA	X	X
Closed Season	1 <sup>st</sup> July to 30 <sup>th</sup> September	July 1 <sup>st</sup> to July 31 <sup>st</sup>	Fishery closed, but industrial fishing occurs under the research program which fished from March to August during 2010
CITES export limit	X	X	210 t per year (2006-2010)
Government TAC limit	347 t per year (2011-2012)	X	X
Additional Regulations	Prohibition of diced conch	X	X

In 2003 a significant trade review for conch by CITES submitted recommendations to Belize that it should establish cautious catch quotas, initiate the collection of catch and effort data and implement a long term monitoring program. These recommendations would need to be complied with in order for Belize to continue to export conch. The Belize Fisheries Department implemented biannual national conch surveys from 2004 and continues to use this approach in the development of population models upon which to base

quotas. This survey data is used to estimate density and is then multiplied by the total suitable habitat for conch in the survey area to give an overall abundance. The abundance is then used in conjunction with production figures from the cooperatives using simple production model equations to calculate potential yield of the resource and the maximum sustainable yield.

By comparison, both Guatemala and Honduras have lagged behind Belize in the management of conch resources. For Guatemala this is in part understandable because the country does not consider conch as a nationally important fishery in comparison to other marine resources from the Caribbean such as shrimp and Manjúa (*Anchoa parva*). As a consequence there has been little incentive to invest in developing management for this resource in Guatemala. It could be argued that scarce management resources should be focused on more dominant fisheries especially those directly connected to rural food security such as Manjua. Despite the lesser relative importance of conch in national fisheries statistics Guatemala has a significant regional role in conch fisheries through its close connection with southern Belize and the high volumes of conch that are moving through the two main towns in the Guatemalan Caribbean.

Guatemala produced a national plan for the exploitation of *Strombus gigas* in the Guatemalan Caribbean in 2010<sup>1</sup>. Due to the lack of exploitable populations of conch in Guatemalan waters this plan is oriented towards a series of recommendations to increase cooperation in the protection of conch regionally. The report suggested that since Guatemala is a member of CITES it should be recording and reporting imports of conch, which it is currently not doing. It also recommended that the closed season of the 1<sup>st</sup> July to 30<sup>th</sup> September of each year, which is the closed season in Belize, should be harmonized across the region to include Guatemala. Guatemala should also establish a registry of hotels and restaurants serving conch in an attempt to control consumption of conch during the closed season. These suggestions are echoed as part of the current management strategy detailed in this document.

In Honduras management attention has focused solely on the industrial fishing interests which occur in the Eastern Exclusive Economic Zone of Honduras. Small scale and subsistence fisheries as a whole have been largely ignored by existing management frameworks for any marine species in the Honduran Caribbean. This means that the western areas of Honduras which are dominated by subsistence and small scale fishing communities and do not have industrial fishing interests, including the Gulf of Honduras, have not been the subject of fisheries management plans and have limited fisheries department presence (One fisheries officer).

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<sup>1</sup> Ruano Solares, S. R., A. Salaverria, et al. (2010). Estudio de la dinámica poblacional del caracol gigante *Strombus gigas* en la región caribeña guatemalteca y plan nacional de aprovechamiento de la especie, CONAP/FONACON.



From a purely economic perspective the government's focus on the industrial fisheries as important sources of capital generation is understandable. Yet from a socioeconomic and development context the importance of marine resources to coastal communities and the need to sustain these resources to support their current and future livelihoods is undeniable.

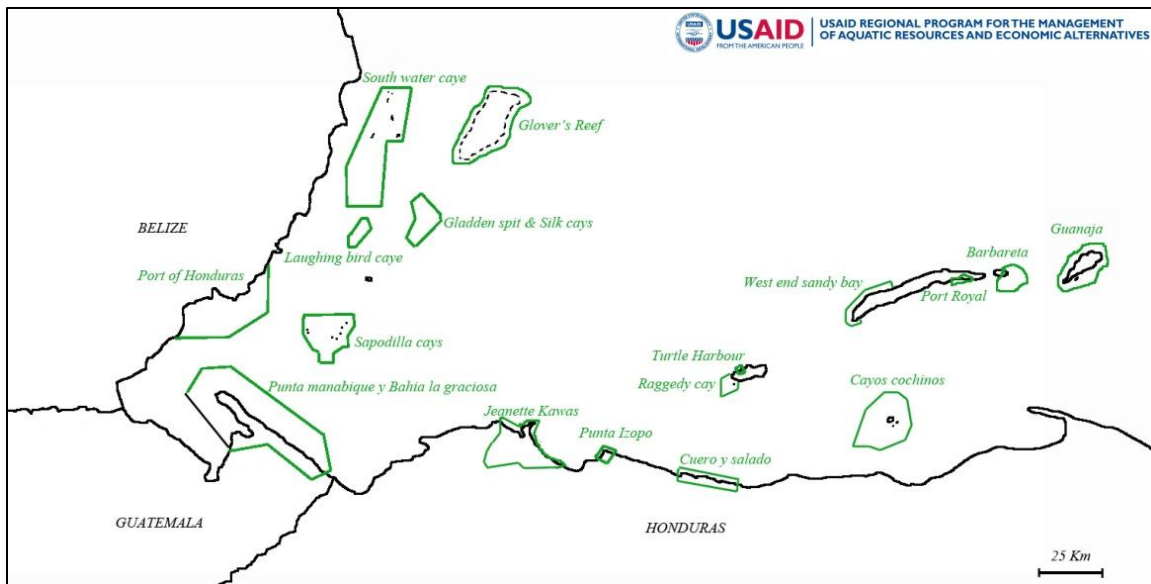
Following rapid growth in the Honduran conch fishery during the 1990s with little oversight or control, CITES recommended a ban of exports from Honduras in 2003 due to concerns of unsustainable exploitation. The government closed the fishery in 2005 following a phasing out of exports during 2004. The government placed a moratorium on conch that applied to the industrial fishery as well as the small scale and subsistence collectors although this was not visibly enforced on the latter fisheries sector.

The industrial fishery was reopened in 2006 under the banner of a scientific research program. Four industrial boats were granted a combined annual quota of 210 metric tons for export. The program ran intermittently for 4 years to 2010 with the aim to produce data upon which to build a management framework and assure CITES that the stock was being managed sustainably. The data collected aimed to develop regulations including seasons and minimum sizes and through populations models estimate exploitation levels which would be sustainable. The program also aimed to demonstrate that the industrial fishery could be effectively monitored and catches regulated. At the date of writing (September 2011) the management plan for the industrial conch fishery of Honduras has not been published and a decision to reopen the industrial fishery and lift the moratorium on conch fishing has not been made. As such conch fishing remains illegal in all the waters of Honduras and as a consequence there are not minimum sizes, closed seasons, or other legislation in place.

Overall the main protagonist for management of conch in the Gulf of Honduras has been Belize with neither of the other two countries having historically invested in the management of this species in this area.

## **CURRENT MANAGEMENT ARRANGEMENTS**

Belize management actions include a systematic data collection and analysis program for conch, incorporating both fisheries dependent (landing records from the fisheries cooperatives) and fisheries independent data (biannual underwater visual surveys). In addition there is a network of marine protected areas including the Sapodilla cays, Port of Honduras and Glover's that are connected to the goals of fisheries management, by aiming to protect ecologically important areas with increased oversight of fishing activities in these sites (Map 2).



**Map 2 – Marine protected areas within the Gulf of Honduras and the Bay Islands.**

Enforcement capacity is present through patrols by the fisheries department, the coast guard, the Belize Defense Force and the non-governmental organizations in charge of the co-management of marine protected areas. Participation in management is considered to be high due to the central role of the fisheries cooperatives in the structure of Belizean fisheries. These cooperatives have strong links with the fisheries department enabling mechanisms for input and feedback in the management process and are particularly important in the collection of data upon which subsequent quotas are based.

Guatemala has two fisheries inspectors one based in Puerto Barrios and one in Livingston. There is no naval presence in the area and the fisheries inspectors do not have boats. There is no specific plan for conch beyond a closed season for the month of July for all Strombid species. Assessments made of current conch populations found few individuals and there have been no sustained attempts to collect landing data or enforce CITES requirements for the conch entering Guatemala.

Honduras has one fisheries inspector in the Gulf of Honduras region, based in Omoa. There is a naval base in Puerto Cortes but they have not generally been involved in fisheries law enforcement in the area. The industrial conch fishing plan, when it does get released, will not encompass the Gulf of Honduras nor apply to the small scale and subsistence fishers as they have not been taken into account during the data collection process. Honduras keeps landing records and CITES records for its exports to the United States although the security of the data from intentional or accidental change or deletion is extremely poor within CITES office and DIGEPESCA. Monitoring and control has focused on the four boats and the licensed packing plants during the conch research program. It is widely believed that extensive illegal and unreported landings occur across the north shore and enter the market chain. The volume of these unreported landings

and the extent of illegal fishing have not been considered by the conch research program.

The reopening of the industrial conch fishery may be complicated by the phasing out of lobster diving. It will be difficult to effectively regulate the fisheries if conch boats are allowed to use SCUBA whilst the lobster boats are not, especially considering the large overlap in the collection activities of these two fisheries. This topic however is beyond the scope of this plan

# FRAMEWORK

## OVERVIEW

Conch management across the Gulf of Honduras needs to be structured so that it becomes an iterative process using feedback from monitoring to improve decisions made in unison by the three countries across the tri-national area.

The first step in this process is to harmonize existing regulations so that the three countries are in accord concerning the fundamentals of the conch resource. Subsequently, effort must be invested in both Guatemala and Honduras to address the significant data deficiencies that they have for their small scale fisheries in the Gulf of Honduras for conch as well as all other marine resources in their territorial waters. Both Guatemala and Honduras must develop accurate registries for the number of fishing boats and number of active fishers that they have in the region and maintain these records up to date as one of the fundamental building blocks for management.

The third overarching aim should be to expand effective ecological and fisheries monitoring systems using standardized methodologies for the region and linking data sets between countries in a trinational data pool to form the basis of cooperation through information sharing.

These monitoring systems at the appropriate scale are essential to provide managers the ability to evaluate the extent and rate of change, learn from their previous actions and develop subsequent coordinated strategies based on new information. Given the interconnections of fisheries the goal must be to develop capacity for fisheries management overall in the Gulf of Honduras and whilst this plan is focused on conch, many of the strategies outlined here will have wider application in marine resource management.

Specific objectives of this plan are to:

1. Harmonize regulations across the three countries for the Gulf of Honduras small scale conch fishery.
2. Implement mandatory annual fishing licenses for small scale fishers and boats in Honduras and Guatemala to match that of Belize.
3. Develop effort based fisheries monitoring and control mechanisms as a cost effective method for management to complement in water visual surveys
4. Focus the limited available resources on the control and regulation of markets and trade routes of conch, including strengthening CITES as a more efficient mechanism to enforce regulations and indirectly control fishing activity
5. Promote schemes that impede growth or reduce capacity in the conch fishery by developing sustainable alternatives
6. Promote schemes to enhance adherence to fisheries closed seasons by developing alternative fisheries during these months
7. Implement targeted scientific research to provide baselines on the population, specific parameters for population modeling and guidance for ecosystem based management of conch including the connectivity of populations
8. Develop a Regional Fisheries Management Organization (RFMO) for the conch fisheries of the Gulf of Honduras. This body should apply the same management cycle and self assessment procedures as national management organizations but enhance mechanisms to share data and reports between the three fisheries departments and local nongovernmental organizations relevant to conch management in each country

The goals, their justification, strategy, and timelines are discussed below for each objective.

# OBJECTIVES, GOALS AND STRATEGIES

## Objective 1.

### Harmonize conch fishing regulations across the three countries for the Gulf of Honduras

#### Goal

To harmonize the fisheries regulations for small scale and subsistence fishers of Queen Conch in the three countries of the Gulf of Honduras so that each country has the same closed season prohibiting capture and / or trade, and a set of minimum sizes and weight for harvested conch.

#### Justification

The harmonization of regulations facilitates enforcement by enabling control to be coordinated across a region. Harmonization can also improve adherence by limiting opportunities to evade country specific regulations. The existing discord in regulations may encourage illegal activity such as fishers selling conch in Guatemala that is collected during closed season in Belize. Harmonization can help by stopping inconsistencies between countries that provide these opportunities for evasion.

#### Strategy

There are existing precedents for the harmonization of fisheries regulations at regional levels in Central America, with the most recent example being for spiny lobster. Through regional governance mechanisms including OSPESCA, SICA and TRIGOH the regulations on conch should be harmonized for the Gulf of Honduras. This harmonization should be specified to cover the small scale and subsistence fishers of each country and look to incorporate the regulations on closed season, minimum size and gear restriction as outlined in Table 2. These regulations should be based to begin with on the regulations of Belize as these have been established for some time.

Table 2 – Recommended regulations for the Gulf of Honduras Conch fishery

<i>Closed Season for capture or trade</i>	1 <sup>st</sup> July to 30 <sup>th</sup> September each year
<i>Gear Restrictions</i>	Cannot use compressed air

<i>National Trade</i>	Prohibition of the trade in diced conch
<i>International Trade</i>	Must comply with CITES regulations
<i>Minimum clean meat weight (90%)</i>	3 oz
<i>Minimum clean meat weight (100%)</i>	2.75 oz
<i>Minimum Shell length</i>	178 mm
<i>Minimum Lip thickness</i>	To be determined

Further scientific study should be encouraged across the region to continue to evaluate and modify these regulations where needed, such as providing a justifiable minimum size for lip thickness and continuing to evaluate if the current minimum length and meat weights are providing enough protection from growth overfishing by protecting a sufficient proportion of the juvenile stock.

In the case of Honduras, where there is a spatially distinct industrial fishery which will be managed separately, it is strongly recommended that this industrial fishery adopts a similar harmonization of closed season and size restrictions to prevent undermining the harmonization process in the region. It is also recommended that the industrial conch fishery follows the lobster fishery in banning tank diving to prevent complications in regulating both fisheries.

## Timeframe

The harmonization process for conch in the Gulf of Honduras should aim to ratify an agreement on or before the 30th June 2012 to enable a closed season across the region to start on the 1st July 2012.

## Objective 2.

**Build a registry and license system for small scale fishermen in the Gulf of Honduras that is shared regionally between fisheries departments**

## Goal

To establish vessel and fisher registries for small scale fishers in Guatemala and Honduras to complement the existing registry in Belize and connect the databases of licenses with records of fisheries infractions across the three countries.

## Justification

Fisheries control depends on being able to monitor and regulate the exploitation of a resource. As such it is essential to know the number of people who are targeting a particular fishery. From a socioeconomic standpoint it is also useful to know how many people are reliant on a particular fishery to understand the relative importance of a resource to local livelihoods, food security and the wider economy.

## Strategy

Two registries should be developed in Guatemala and Honduras one for vessels used for small scale fishing and one for fishermen who sell their catch. These should complement the existing registry and licensing system that is in place in Belize and improve the existing boat registry system in Guatemala.

A vessel registry should be built and maintained to include all vessels which are used for fishing when all or part of the landed catch is traded or sold. Boats should be registered and marked with the register number that can be seen clearly on the side of the boat. All fishing vessels should be required to register and the register needs to be maintained and kept up-to-date by the fisheries department. All vessels should be inspected once per year with renewal requiring a visual inspection of the boat not just resubmitting paperwork.

A fisher registry and licensing system should be developed for all fishermen who trade or sell their catch. Similar to the vessel license this should be mandatory and renewable yearly with fishers receiving a waterproof identification card and a specific, non-transferable license number linked to his national identity number..

Random inspections from patrols at landing points checking boats unloading catch and fishermen working on the boats can be used to determine compliance levels. This can be complemented by patrols in the sea where logistically and financially possible. Failure to have a valid vessel license should result in fines to the boat owner and to the person buying the product from the boat. Failure to have a fishing license should result in a fine to the fisherman and to the boat owner. This should encourage compliance and discourage the seafood chain from working with unlicensed individuals or vessels.

The process of establishing and updating a license either for a fishermen or a vessel owner should not be time consuming and the process needs to be made as accessible as possible to encourage uptake. This can be accomplished by making visits to each fishing community with a database on a portable computer and card printer so that boats and fishermen can be registered in situ and licenses can be issued immediately.

The database can be stored centrally online for ease of access irrespective of computer terminal and through this mechanism can be shared with fisheries departments in each region. Awareness campaigns should be implemented to

advertise the need and importance of being registered and announce the dates for visits to the community by the licensing authority.

The three countries should issue yearly reports updating stakeholders on the number of active boats and active fishermen for the country.

Fishing infractions can be linked to the same licensing system so that individual fishers and boats can be identified and connected with the infractions they perpetrate. This could be used as the basis for scaling fines or punishments with repeat offences. Infractions by nationals of a different country in a country's territorial waters should be shared with the respective country of origin of the fisher so that their record can be updated. This could occur through a monthly report between countries on fisheries infractions.

These fisheries infractions must be computerized and stored in a database to enable efficient evaluation in the change in fishing infractions over time and identify repeat offenders, areas where offences are occurring and which offences are most common. This is not currently routine in any country yet would help in targeting future enforcement schemes by identifying areas of illegal activity and evaluating whether enforcement is changing the level of compliance.

Specific attention should be paid to the license registry of boats between Guatemala and Belize to identify dual licensing of single vessels which aims to confound management oversight. Dual licensing should be discouraged.

## Timeline

Both Honduras and Guatemala have been talking about implementing license schemes for small scale fishers for a significant amount of time. Considering the fundamental importance of licensing in providing the required information to underpin fisheries management, licensing should occur as soon as possible. Fisheries management will struggle to progress without this basic level of information and oversight. Licensing can also then become a basis for data sharing and mutual responsibility in managing shared resources.

## Objective 3.

**Develop effort based fisheries monitoring and control mechanisms as a cost effective method for management to complement in water visual surveys**

## Goal



To establish a monitoring and control mechanism on effort based fisheries to reduce the management cost of collecting information and at the same time complement in water visual surveys.

### Justification

Stocks in Belize have been monitored through biannual biomass surveys. These surveys have been conducted by snorkelers swimming fixed distances and counting and measuring conch. By conducting a large number of such transects, the total biomass of conch has been estimated. There remains uncertainty however over whether the mean biomass can be appropriately scaled up to the whole area of estimated suitable habitat to give total biomass estimates. This is because conch aggregate and may only use a quarter of the total potential area of suitable habitat.

Over reliance on one monitoring scheme upon which to base management decisions can be problematic if that method does not reflect changes in the status of the fishery over appropriate spatial or temporal scales. It is thus preferable to develop a suite of metrics that can be analyzed together to provide a clearer picture for managers to make decisions.

In addition in countries such as Honduras and Guatemala that do not have systematic surveys taking place, establishing landing based monitoring systems is less expensive and faster to implement.

A catch and effort index which calculates the amount of effort fishers are using to collect a specific amount of conch is a suitable additional index appropriate for the management of conch fisheries. Collecting catch and effort data is straight forward especially with the cooperative structure of the Belizean Fishery or the centralized market structure organized around buyers in Guatemala and Honduras. It can be the least expensive source of information that can be used to estimate stock size.

### Strategy

Landing data needs to be collected that can determine the number of man hours it took to collect the landed amount of conch and preferably have this linked to particular fishing sites. There are standard methods for collecting this information including developing framing surveys for areas where data has not been conducted previously. Efforts are underway in Honduras to develop networks of data collectors by training community members to monitor landed catch as part of local management initiatives. This has the potential to be expanded across the region.

Catch per unit of effort (CPUE) can be calculated for different levels management requirements. For example it could be calculated for each fisher in a cooperative

or for each boat in a fleet. CPUE can also be calculated over different time periods that make sense for the specific fishery, such as conch per hour for individual fishermen, or conch per month for a known fleet size with a set number of fishers. CPUE can also be disaggregated into fishing banks or areas that can make suitable spatial units for the management of the fishery. The design of the relevant units of CPUE for a specific area in the context of the fishery mean that it can become a useful monitoring tool irrespective of the variation in abilities between fishers. In addition by establishing CPUE for different fishing areas that fact that conch aggregate and are not homogeneously distributed across a fishing area can be accounted for.

Models based on CPUE can be used instead of (or in addition to) biomass survey based models. The models can provide estimates of expected CPUE at the Maximum sustainable yield (MSY) point, so that the observed CPUE (e.g. catch per day) can be directly compared to this value<sup>2</sup>.

Management triggers can be linked to CPUE so that if the CPUE changes for a number of years, action can be taken to correct it. Long-term monitoring would depend on being able to generate annual CPUE by fishing ground which would be cheaper and logistically simple than repeatedly conducting in water surveys.

It is also possible to use CPUE data to manage the stock above a specific overfishing point defined by managers. This importantly can be segregated by bank of fishing zone. Standardized CPUE as a proportion of the estimated unexploited CPUE can be used as the indicator and trigger for management action.

For example:

Precautionary trigger: *50 percent unexploited CPUE*<sup>3</sup>

If CPUE falls below this point a rebuilding programme is implemented by closing the bank or limiting fishing effort in that area.

Closure trigger: *30 percent unexploited CPUE*<sup>4</sup>

If a bank falls below this point, the fishery should close for this area for a specified amount of time and then be reassessed.

Using CPUE is highly appropriate to conch fisheries management as fishing effort directly reflects density changes as fishers must search harder at lower densities. CPUE may specifically reflect the loss of aggregations as there will be

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<sup>2</sup> Further information on the methods and calculations for using CPUE to calculate MSY are available in FAO technical paper 514 "Monitoring and managing queen conch fisheries – a manual" 2008.

<sup>3</sup> It must be noted that a drop to 50% CPUE does not mean that the biomass of the fishery has dropped to half. It signifies that a fisher must search twice as hard to collect the same amount of conch as in an unexploited fishery.

<sup>4</sup> A drop to 30% CPUE means that fishers must work three times as hard to collect the same amount of conch as in an unexploited fishery.

a steep decline in catch per unit effort when an aggregation is over exploited. Since conch has high sensitivity to changes in density during its lifecycle, management regimes based on CPUE are likely to be more responsive than on mean abundance estimated across wide areas from surveys. CPUE is also the indicator of choice to monitor conch as it is usually the cheapest method and can be maintained over a long time period with minimal investment in equipment or training and so is appropriate for poorly resourced fisheries departments.

Linking CPUE to specific banks also means it is possible to make management units smaller. This can be specifically appropriate to start the process of connecting rights based management by granting access to specific banks and CPUE statistics provides the relevant tool for monitoring the fishery at this scale.

Whilst CPUE is just one tool in the management toolbox it is strongly recommended that it is adopted and that work is invested in developing the appropriate models that can be used to link CPUE levels with stock density and biomass.

## Timeline

It is recommended that CPUE data collection is added to the existing monitoring structure through the fisheries cooperatives in Belize and that co-management NGOs in the zone adopt it as part of fisheries monitoring strategies. This has started in Glover's reef by WCS but needs to be expanded to other areas.

Following this both Honduras and Guatemala should establish this as the primary monitoring mechanism for conch fishing in the gulf of Honduras small scale fishers and on the Bay Islands. National NGOs and fisheries associations should be approached to begin this data collection effort.

## Objective 4.

**Increase control and regulation of national markets and trade routes of conch, as a cost effective mechanism to enforce regulations and indirectly control fishing activity.**

## Goal

To develop records of trade and market movement as a point of monitoring and control of conch fisheries and the application and enforcement of conch regulations to indirectly effect fisheries compliance.

## Justification

In the region there are limited available resources for fisheries monitoring and control. Within Guatemala and Honduras specifically there is currently very limited capacity in the fisheries department's personnel and logistical support in the zone. Conch fishing in all three countries is organized in a pyramid structure, so whilst there may be lots of fishermen at sea, which it is time consuming and expensive to monitor, there are only a few key people and locations involved in the commercialization of the majority of conch produced by the fishermen. By focusing control on the "bottle neck" which is naturally brought about by the economies of scale of fish commerce, it is possible to maximize efficiency in monitoring of conch regulations and fishing activities. Given the current capacity limitations of management agencies, attention should be placed on monitoring main landing sites and the principle conch trade routes with the longer term plan of increasing capacity to be able to monitor fishing activity at sea.

## Strategy

Overall the aim should be to register and monitor individuals and businesses involved in the commercialization of conch across the value chain to ensure they are complying with the regulations established for conch in the Gulf of Honduras. By effectively enforcing regulations on the market chain, the actions of the fishermen can be similarly influenced. If there is not a market, fishers will not bother to collect it.

### *Monitoring primary buyers*

Primary buyers are businesses that buy conch directly from fishermen for resale. They generally have the capacity to store and transport conch in larger volumes. In Belize this function is conducted by the cooperative system and this has been an effective mechanism for monitoring and control of the conch that are sold to this value chain. In Guatemala and Honduras where cooperative systems do not exist, primary buyers are independent merchants with the infrastructure to store and move conch in volume.

In Guatemala there are estimated to be only four separate businesses involved in the majority of conch commerce as significant primary buyers. These buyers (which also provide fishing support for the conch and lobster boats) should be the focus of monitoring and control of the conch fishery for Guatemala.

Considering that most conch available in Guatemala is caught in Belizean waters, efforts should be made to incorporate the conch merchants into the process of legally importing the conch and registering it through CITES (see Objective 5). Conch merchants must be required to keep records of the conch they purchase from fishers and subsequently trade under the terms of the fish

merchant license. Information on purchases is regularly kept by fish merchants anyway to keep record of the debts of fishermen. The relevant management agency in Guatemala must have the authority to be able to conduct random checks to validate the accuracy of the records. This can be easily achieved by comparing the amount of conch on their premises to that recorded in their books. Records can be collated by the fisheries department monthly for storage in a database to monitor landing levels.

In Honduras specifically it is strongly recommended that the industrial fish packing plants be prohibited from purchasing conch from any source other than directly from licensed industrial conch boats. Small scale fishermen should be encouraged to find distinct market chains supplying the national market through specific primary buyers. Separating the industrial fishery from the small scale fishery is important as industrial conch currently floods national markets depreciating prices and encouraging small scale fishers to over exploit their resources as prices are depressed through the competition with the industrial fishing sector.

Importantly, prohibiting the purchase of conch from any source beyond the licensed boats by the industrial packing plants, could help reduce the flow of unreported conch believed to be landed illegally away from the main industrial fishing docks. These landings are subsequently sold on to the plants for processing as though it had come from the small scale fishers of the north shore, although the quantities involved mean that the small scale fishery is an implausible source. Limiting the ease with which products from unreported and illegal landings from industrial boats can enter legal market chains is a key requirement for improving the sustainability and management of this and other fisheries. Industrial plants should be inspected randomly and should be able to prove provenance of all conch they are processing as coming from the registered industrial fleet.

The premises and people involved in the trade of conch from the small scale fisheries should therefore be registered and licensed separately to the industrial fishing infrastructure. The conch that is bought and moved by this supply chain should be monitored. Inspections of their premises and the conch stored there should occur on a random basis to ensure compliance with conch regulations, especially closed season and minimum meat weight.

Chopped conch should be banned from commercialization in each of the three countries as per the harmonization of regulations. Chopped conch can be used to disguise the original small size of the conch individuals. Non-compliance with the regulations should lead to fines that increase with the extent and frequency of infractions.

*Secondary buyers, market stalls, shops and restaurants*

Market vendors, shops and restaurants tend to purchase their conch from intermediaries although some will have direct connections with fishermen. All local market stalls, shops and restaurants should be registered if they sell conch. The owners should keep purchase receipts for conch bought either from fishermen or from primary buyers. Restaurants and shops should supply copies each month to the management authority of purchase receipts with the date, fisher's identity or merchant's identity, amount bought and value of the conch.

This data will help not only in regulating trade but in quantifying local consumption which is an important gap in current data sets for management. With growth in tourism, restaurant purchase may be one of the largest changes in local consumption especially in Belize and in the Bay Islands. Trade to this sector directly from fishermen is currently not recorded accurately within Belize and it is currently difficult to quantify the volume of conch in the national market. Domestic consumption may be an important factor to include in quantifying total fishing mortality occurring. Efforts should therefore focus on registering and monitoring these value chains effectively.

In Honduras there is significant conch trade through national markets including those in Puerto Cortes within the Gulf of Honduras zone and on the Bay Islands. Conch is also available across the country including in supermarkets. In Honduras the provenance of the conch in national markets must be clear and merchants must keep records of the source of their conch. The industrial conch packers are already part of a scheme to provide provenance for their legally landed conch if it is sold in to the national market chain. This program is being piloted on the Bay Islands but needs to be expanded nationwide. Traders must be encouraged to participate in continuing this chain of provenance up to the consumer and for small scale fishermen to develop their own "brand".

Random checks should be made on the trade in conch at each stage of the market chain, from primary purchasers, market traders and restaurants to ensure compliance with the licensing, records and provenance schemes as well as adherence to fisheries regulations. Focusing effort on monitoring trade and ensuring compliance within the market chain with the regulations including closed season, minimum size and a ban on chopped conch will help build compliance throughout the fishery. Fishers will be discouraged to land what cannot be traded, decreasing the incentive for illegal or unreported fishing activity. Monitoring the market chain is much more cost effective than monitoring dispersed fishermen at sea.

In conjunction with the monitoring program there is a need to also implement an awareness program with the traders about the regulations and any applicable sanctions for breaking the regulations. Secondly awareness must be built with consumers about the importance of their participation in sustaining the conch fishery and for only wanting legal conch. This should include awareness about closed season and undersize and why their actions influence the future of the

fishery. Seafood awareness programs are currently underway in the Bay Islands of Honduras coordinated by Coral Reef Alliance, Roatán Marine Park and the Centre for Marine Ecology, Utila and this should be scaled up across the region if it proves successful in changing purchasing habits

## Timeline

The registration and licensing of traders in conch should occur concurrently with the vessel and fishermen registration process. Once regulations are harmonized across the region these should be socialized to the market chain as well as the fishermen. Subsequent monitoring and enforcement should be incorporated in to the time management and planning for each operational year of the fisheries departments as an ongoing component of their management role.

### **Objective 5.**

**Increase control and regulation of international trade between Gulf of Honduras countries, strengthening CITES records to help quantify and monitor trade levels within Central America**

## Goal

To streamline CITES and export permissions to encourage legal trade in conch between Belize to Guatemala and between Honduras to Guatemala. This will include the establishment of new markets for southern Belize cooperatives in Central America, and from producers in Honduras whilst strengthening CITES data sets for use in monitoring and control for management.

## Justification

International trade to the main regional importers of conch such as the United States is documented by Belize and Honduras under CITES. The trade between these countries and other Central American countries including Guatemala is however currently not documented. Illegal, unreported and unregulated (IUU) fishing which is linked to illicit trade is a regional problem and requires a regional international solution. CITES may provide a means to help reduce illegal catches by trade controls. The requirement that catches are documented and their provenance marked can help make it increasingly difficult for illegal catches to enter the mainstream market, depressing the demand for illegal, unreported and unregulated catches.

The current trade between countries in the Gulf of Honduras may represent significant volumes of conch that are currently not included in production statistics and thus confound management oversight, especially the setting of total allowable catch in Belize. Regulating and documenting trade in conch between Central American countries and improving the adherence of the agreements

founded in CITES is thus fundamental to the long term management of conch in the region. Improved control and monitoring of trade can also help curb illegal trans-boundary fishing that occurs in the zone.

## Strategy

Important trade routes move conch internationally in the Gulf of Honduras. Connecting CITES to the monitoring of the national traders in conch would help develop records to comply with this convention and limit possibilities for illegal trade and illegal fishing.

### *Trade from Belize to Guatemala:*

Conch flows from southern Belize in to Guatemala entering either in Livingston or Puerto Barrios. Up to an estimated 60 tons of conch annually arrives into these ports. This conch must come from Belize as conch production within Guatemala is not significant. There are therefore three main sources of this conch:

1) It is caught legally by Belizeans and then taken for sale in Guatemala. 2) It is caught legally by dual nationality Belizean-Guatemalans and then taken to Guatemala, 3) Conch is caught illegally by Guatemalans in Belize and taken to Guatemala.

Considering that conch entering Guatemala may account for as much as 20% of the total allowable annual catch of the Belizean conch fishery, it is important that this trade be quantified and monitored so that it can be incorporated into official figures for management purposes. To achieve this, the process of registering the export and receiving a CITES permit needs to be streamlined and made accessible and fast to legal fishers.

Currently exports need to be registered by the fisheries department and the office is in Punta Gorda. Geographically it is not ideal for fishers to return to Punta Gorda from outer banks to register catch before moving it to Guatemala. Compliance is low and records do not exist for this trade partly perhaps because it is not easy to export things legally and easier to evade the point of control.

Monitoring and control is a tradeoff of expense versus results. In this case it is important to quantify the amount of conch leaving Belize and to start limiting illegal fishing by developing legal mechanisms that conch can be exported by regulated. Positioning the control point away from the trade route does not facilitate reaching these objectives. It would therefore make logistical sense to have a representative based on Sapodilla cays who can record planned exports directly with fishers before they are moved to Guatemala. This could be done through the facilities already established on the cays for the management of the marine protected area and is a logical location on route to Guatemala.



An inspector based on the cays could confirm the quantities and provide the required paperwork before the shipment leaves again. Legal trade should be encouraged and channeled through this area. Connecting the CITES and export permission to monitoring and control in Guatemala would then aim to ensure that the process is complied with. In this way, the fisheries department is assisting to make the process more accessible but is also then more focused on preventing illegal trade. This combination can push people into following the legal route improving data collection and monitoring for management.

Buyers in Guatemala would need to prove that the conch they are marketing arrived into the country legally and likewise boats landing conch would need to demonstrate that it was bought into the country with the correct license. This would be enforced by the fisheries inspectors in Puerto Barrios and Livingston.

If this process was enforced it would significantly cut opportunities for illegal fishing as non Belize nationals would not be able to receive a CITES export permit in Belize. Guatemalan fisheries personnel should monitor the conch purchasing facilities and record the CITES documentation of landings. This would mean that Guatemala is also complying with their CITES obligations to register imports of CITES species. This approach can start the coordination of management of conch between neighbors in the region, encourage legal trade routes and decrease opportunities for illegal activity.

There is also a real potential for cooperatives from southern Belize to develop trade partnerships with Guatemala as an alternative to their traditional trade route that has to link through larger cooperatives to the United States. There is obviously a strong demand for conch in Guatemala and other Central American countries such as El Salvador, so efforts should be made for Belizean registered fishermen to capitalize on this market legally.

A database linking the CITES representatives to the fisheries department and to the Guatemalan fishing department can help track trade and ultimately control levels. The data collated from this initiative should then be included in catch totals for setting Belizean fisheries quotas.

Streamlining CITES and export procedures are important to encourage compliance. Overly complicated, logistically challenging or time consuming paperwork will discourage compliance and fishers and traders will look for ways to evade the process. Promoting legal trade, and encouraging Belizean cooperatives to diversify their markets to supply Central America can help in this process.

#### *Trade from Honduras to Guatemala*

Conch moves across the border from Honduras in to Guatemala. Conch is mainly shipped cleaned and packed in large 100 lb bags as per the industrial

fishery packing process. It is shipped, mainly by road, in refrigerated container. The origin of this conch is unknown but it likely to be the unreported conch landed by the industrial fishery combined with conch from small scale production that is similarly packed and cleaned.

The point of control needs to be at the export location i.e. the road border crossing as well as with the conch merchants in Guatemala. Customs inspections at the border should require shippers to have CITES permissions for their conch that would be provided *apriori* by the fisheries department in Honduras. Since the origin of conch is La Ceiba this should be through the La Ceiba office. If the official in charge of CITES permissions is not shown the providence of the catch then the export permission should be refused. This can reduce unreported and illegal landings that are then moved in to Central American markets. Customs officials need to be aware that conch requires a CITES permit and should be able to update records in real time of shipments of conch crossing borders using a cross departmental trade database for conch. The providence of conch entering Guatemala needs to be clear for inspectors on that side of the boarder.

The CITES system for data collection and storage needs to be coordinated specifically for conch between the three countries. A specific tri-national database could help in this regard, where customs and fisheries inspectors can input data and have access to the information in real time. The current paper based system with significant delays of at least one month between customs records being sent to CITES does not reflect data management capabilities in the 21st century. The CITES and export records system needs to be able to be used as a real time monitoring and control mechanism that integrates inspectors at different points in the chain from granting licenses to inspecting that these licenses are correct.

### Timeline

The development of legal trade routes must occur in synchrony with the enforcement of regulations. After regulations are harmonized across the region and the monitoring or landing sites is routine, promotion of legal trade needs to occur. The three countries can coordinate the implementation of CITES for conch starting with the design and use of a tri-national conch trade database that is accessible via the internet in real time to the relevant licensing and control authorities in each country.

### Objective 6.

**Develop schemes that impede growth or reduce capacity in the conch fishery by developing alternative livelihoods**

### Goal

To develop innovations for alternative employment opportunities and income sources in addition to maximizing the value of existing conch capture by developing products from the shell and waste from cleaning to discourage entry into conch fishery

### Justification

People are prone to enter a fishery due to external economic conditions and the reduction in surrounding employment opportunities. This is especially so in areas where fishers are often not the owners of boats and are simply fishing as hired labor, such as the structure of fisheries in Honduras and Guatemala. Limiting this growth and protecting existing full time independent fishermen should be a priority and requires connecting the goals of conch management to the wider goals of economic well being in coastal communities. Whilst a fisheries registry system can ultimately be used to control license numbers this needs to occur in conjunction with identifying and promoting viable local employment alternatives to dissuade new entry.

### Strategy

Effort must be placed in promoting interventions that provide employment opportunities as viable alternatives to fishing. In Guatemala for example recent pilot projects have looked at establishing small holdings for fishermen to raise chickens, pigs and staple crops. These interventions whilst seemingly unrelated to conch management help to reduce the direct reliance on fishing by these communities and are ultimately limiting capacity in the fishery.

Seed funding for alternative livelihood schemes in coastal areas may be required to start these initiatives. Effort should be invested in evaluating how these schemes alter the employment profile of members of the community and the shifts in the reliance on conch and other fisheries. Development projects that promote increasing capacity in fishing or fishing efficiency such as the donation of boats, engines, fishing gears and other fisheries infrastructure should be discouraged.

Secondly, schemes should look to develop a market and methods to give greater value to landing the shell, which are currently discarded. This could allow better enforcement of shell based controls as well as improve returns to the fishery. Whilst the weight of the shells means that transporting them from offshore banks to communities for use in local crafts is problematic for some fishing areas, communities should be identified where this is a viable proposition. For example small scale fishermen in the Utila cays could supply shells for use in artisanal crafts for sale to tourists. Similar possibilities occur in southern Belize where tourism continues to grow. In addition the waste from conch processing can be converted in to protein feed with potential use in small scale aquaculture such as a feed source for raising snook (see Objective 7)

## Timeline

Initiatives are already in progress in some communities in Guatemala to encourage diversification. These should be expanded and supported as part of ongoing strategies with investments made in the provision of seed funding. It is essential that their impact is measured and can be related to shifts in employment away from fishing. Positive results can then be used to demonstrate the cost effectiveness of these interventions to the wider aim of sustainable fisheries management.

### **Objective 7.**

**Promote schemes to enhance adherence to fisheries closed seasons by developing alternative fisheries during these months**

## Goal

To identify and develop management for alternative species that can be sustainable alternatives to conch collection especially during conch closed season.

## Justification

For people who remain in fishing, alternative fisheries targets can reduce the reliance on conch. Diversifying fishing effort into multiple fisheries can reduce the pressure on one specific resource. To date however, most attention has focused on the management of commercially important conch and lobster fisheries with little attention given to building management frameworks for other species.

These alternative fisheries may make simpler management propositions if they have biological attributes which make them easier to manage such as rapid growth or year round reproduction. Ideally species whose exploitation can sustainably coincide with the closed period of conch should be priorities.

## Strategy

Potential alternative fisheries that have life history traits which make sustainable management possible with limited regulation include the yellowtail snapper and snook. Both these species have high market price and strong demand with snook being prized in national markets and yellowtail snapper having a strong export demand for the United States.

In Honduras work is already underway to develop management frameworks and tools to develop sustainable yellowtail snapper fisheries. These tools should be distributed and promoted in the Gulf of Honduras when they are completed, especially in southern Belize who do not currently routinely target yellowtail snapper by working with the fishing cooperatives in the zone to develop the fishery.

In Guatemala rural communities build pens for wild snook and then attract them into the area with regular feeding. As the snook grow they reach a size when they can no longer escape from the pens and are harvested. This process should be the focus of a specific evaluation and if sustainable should be promoted through knowledge exchanges with other communities who could employ a similar practice.

Both yellowtail snapper and snook have production cycles that could coincide with conch closed season so that they make good choices for this approach. Additional work should focus on finding other species that match these prerequisites and develop plans for these fisheries and then promote them as viable alternatives. Diversifying fisheries is also about diversifying management attention to look beyond the main commercial species so that plans can be established to manage a suite of species that together can make a sustainable coastal fishery with fishers cycling through different species at different times of year, rather than mining through different trophic layers of marine resources.

### Timeline

The development of management strategies for yellowtail snapper will be completed in 2012 based on work being conducted in Honduras. These can then be promoted regionally from 2013. For the gulf of Honduras these will be mainly applicable in communities west of Omoa and in southern Belize especially for the southern fishing cooperatives such as Rio Grande. Communities are already using snook pens in Guatemala and this should be studied as soon as possible. On the conclusion of the study the idea can be expanded to similar communities mainly in Guatemala and southern Belize. Other communities along the north shore of Honduras could benefit from a similar approach although it would be more widely applicable in La Mosquitia where snook is the most important fish caught by local communities. Knowledge transfer between communities can help resolve issues and provide real solutions based on community knowledge. This should be encouraged as a corner stone of small scale fisheries management.

### Objective 8.

**Monitor conch populations and seagrass health across the Gulf of Honduras to estimate status of regional resource**

### Goal

All co-management organizations including both the government departments and relevant non-governmental organizations in charge of fisheries and marine protected areas that encompass suitable conch habitat in the Gulf of Honduras collect biannual survey data on conch populations and annual data on seagrass condition following standardized methods at sites within and beyond the

boundaries of their respective area. Data to be collated in to a shared online database for the region and analyzed for the region.

### Justification

To accurately assess trends in a population an initial or baseline census must be taken and then repeated at regular intervals, using the same methods and counting locations to evaluate change. Data exists from the biannual conch surveys conducted across Belize. In Guatemala and Honduras however sporadic studies at a few sites means that there is no consistent data available to evaluate abundance changes at any location in these two countries. As a consequence it is not possible to evaluate the status of the conch population across the Gulf of Honduras as a whole. In addition it is difficult to measure the efficacy of management and evaluate the effects of fishing if the population in protected areas is not quantified, nor the extent and quality of suitable habitat evaluated over time. Conch populations are estimated by the Belize fisheries department every two years. Beyond Belize there has been no systematic monitoring, including within protected areas in Honduras and Guatemala. Similarly seagrass is routinely monitored in Belize through a regional monitoring mechanism “seagrass net”. This has not been implemented in the two neighboring countries in the Gulf. To enhance management potential all countries and the organizations within the region need to begin adopting these same protocols and then sharing information.

### Strategy

The framework of Belize fisheries monitoring surveys for conch should be replicated in the other two Gulf countries. Biannual surveys should be implemented across suitable conch habitat across the wider Gulf of Honduras region focusing inside and outside protected areas, especially areas where conch harvesting is prohibited. This should occur in the final month of the closed season before the fishery reopens i.e. August.

In water surveys should include the reef and seagrass areas of Punta Manabique in Guatemala and for Honduras; Tela Bay including Punta Sal and Punta Izopo, Utila inside and outside Turtle Harbour MPA, Roatán, inside and outside West End Sandy Bay MPA, Cayos cochinos marine monument, and Guanaja.

There are co-management organizations in each of these areas that have the potential capacity to conduct these surveys. It would be beneficial if each group surveyed within as well as beyond the boundaries of their respective marine park areas. This would not only expand the extent of the survey area covered, but provide direct comparison between fished and protected sites to be used in estimating fishing mortality rates.

The regional initiative “Healthy Reefs for Healthy People” is already coordinating coral reef health appraisals for many of these areas, conducting AGRRA surveys

in conjunction with these co-management organizations. Whilst AGRAA is not a suitable method for conch, the same mechanism for coordinating the personnel and logistical requirements for biannual conch surveys could be used to conduct this work. Data should be stored in a tri-national data base that is also linked to fisheries activity in the areas (Objective 3).

Seagrass net is a worldwide ecological monitoring network that documents the status of seagrass resources using a standardized methodology and quarterly sampling. Given the direct reliance of conch on the quality and extent of seagrass habitat, especially in juvenile stages, it is fundamental that seagrass condition and trends be monitored in the Gulf of Honduras. As such seagrass monitoring using the seagrass net methods should become integrated in to the activities of management organizations in the region and linked to the surveys on conch.

### Timeframe

Surveys across the region should be synchronized with Belize fisheries as they have been conducting surveys since 2004. As such the program should aim to start in August 2012 which is the next scheduled survey.

### Objective 9.

**Implement targeted scientific research to provide specific parameters for population modeling and guidance for ecosystem based management of conch including the connectivity of populations**

### Goal

To conduct targeted scientific research on the lifecycle movements and connectivity of conch populations across the Gulf of Honduras to help inform management planning in the zone.

### Justification

To build effective fisheries policy especially in respect to marine protected areas, a greater understanding of conch spatial ecology is required. Spatially explicit data including movements at each stage of the life cycle and population studies using genetic techniques, can help inform decisions on the size, extent and efficacy of marine protected areas. These approaches can also help to determine if shallow water exploited stocks are supported by deeper water populations as is widely believed to occur in Belize, but has never been proven.

### Strategy

The Gulf of Honduras across to the Bay Islands encompasses a large area of water affected by different ocean currents and fluvial inputs whose influences

vary with the seasons. To manage the regional conch population it is important to determine the appropriate scale at which management activities such as the placement of marine protected areas or the calculation of area specific quotas can be most effective.

In conch the recruitment links between populations may not be strong as conch has only a short three-week pelagic larval stage and it is therefore unlikely they travel far before settlement occurs. The majority of recruits are probably derived locally and it is unclear how much connection the populations in southern Belize have with those of the north shore of Honduras and from the small numbers in Punta Manabique.

Conducting genetic studies, tagging studies and using larval dispersal models can help to identify the degree of connectivity between these areas as well as calculate the amount of spill over from protected areas. These studies need to be conducted across the different banks where conchs are found in the region and an integrated regional study needs to be planned and execute across the area.

Of specific interest is the bathymetric separation of conch, especially in Belize. It is commonly believed that there is a deep water population of unexploited conch that supplements the exploited shallow water population. This has been suggested by personnel within the Belize fisheries department to provide a buffer to the exploitation of shallow water individuals. This deep water population however has never been specifically identified or quantified. There is also no existing evidence that there is a deep water population connected to the shallow water population. Given there is the assumption that the deep water population provides a safety net to overexploitation in shallow water, it is critical to determine if, in fact, this safety net exists.

Tagging could form an important source of information. Both deep water and shallow water conch could be tagged by placing the tag on the shell, which is fast, relatively cheap and tag loss is negligible. The sex, maturity, shell length, weight, flared lip thickness are recorded. Fishers then need to be encouraged to return the tags when they are caught in the fishery and the measurement recorded again when the tagged conch is returned. This can be coordinated through the same data collection at landing points as per objective 3. The data allows growth and mortality to be estimated as well as movements from deep to shallow water or across different areas providing the location of the conch when it was caught is recorded. Where possible, tagging should concentrate on smaller, younger conch. Tagged conch can also be counted during surveys in marine protected areas to estimate movement and survival rates (for natural mortality calculations).

Tagging can provide considerable information quickly on the current state of the resource and fishery. The main problem is getting fishers to return tagged conch to the scientists. A common solution to this problem is to have a fund to reward



fishers for returning tags to the relevant authority. The tags will be overgrown by algae over time and therefore may be difficult to spot by fishers. In addition most shells are dumped at sea so they are not landed. Building awareness with fishers about the importance of their involvement in tagging studies is fundamental to their success and must be the starting point of a tagging program.

In genetic studies, the laboratory analysis and data interpretation is more time consuming and expensive than sample collection, which simply requires piece of tissue from the target animal. None of the three countries has the logistical capacity to conduct genetic studies without the use of foreign laboratories. Collaboration should therefore be forged between the scientists in the countries and external institutions that have the technical capacity to conduct these studies.

## Timeline

In 2011 the Centre for Marine Ecology, Honduras working in collaboration with researchers from Manchester University, United Kingdom and supported by the Honduran fisheries department and the Fisheries Department of Belize, organized the initial phases of genetic studies for a range of species in the Gulf of Honduras region including conch. In 2012 following the initial results, this program is planned to expand to address the research questions outlined above.

### Objective 10.

**Develop a committee to coordinate the management of conch fisheries in the Gulf of Honduras. This body should apply the same management cycle and self assessment procedures as national management organizations but with the aim to enhance mechanisms of data sharing and cooperative on monitoring and control between the three countries as outlined in the above objectives.**

## Goal

To develop a conch management committee for the Gulf of Honduras to discuss and share information and coordinate management strategies, which is backed by shared databases of biological and fisheries information including license registries and trade details within the zone.

## Justification

Whilst cooperation between the countries in the Gulf of Honduras may be difficult for many issues, data and information sharing is one area which should not be as contentious. It is in the best interests of all involved to improve the management

and sustainability of conch and other marine resources in the area. Forming a coordinating body of fisheries personnel, fishermen and nongovernmental organizations can help develop cooperation and ultimately provide the mechanisms to enhance monitoring and control of the fishery, by fostering communication and working relationships.

### Strategy

A regional conch committee can provide the platform to encourage shared research and data use, discuss problems and solutions and develop collaboration in management, especially in combating and controlling illegal unreported and unregistered fishing activity. The conch committee could form a subcommittee under an already established framework for fishers and relevant NGO, such as TRIGOH and incorporate members from the fisheries departments of each country whilst liaising with regional governance bodies such as CCAD and OSPESCA.

The building of connected and shared databases for results of surveys, monitoring of fisheries landings, licenses and trade permissions, for use by the committee and their constituent organizations will underpin data sharing programs and provide the foundation to build dialogue and continue to improve management in the area. In this way the conch committee can provide a model that can be expanded into other fisheries management issues.

### Timeframe

The development of a RFMO for conch is a natural extension of the harmonization of regulations process and would be best formalized as a direct consequence of that initiative incorporating the same actors who were part of the harmonization process. The RFMO needs to function as a connected group that provide relevant and timely information to each other and its role will strengthen over time as the tools for data sharing become established such as trinational databases.

## Summary of Objectives

Objective	Name	Important Actors	Timeframe
1	Harmonize fishing regulations	Fisheries Departments, OSPESCA, Fisheries groups and cooperatives	On or before June 30th 2012
2	Registry and licensing system for fishers	System can be built by an independent organization to support Guatemala and Honduras fisheries departments with implementation supported by NGOs and Red de Pescadores	Completed during 2012
3	Develop effort based control systems	NGOs and Governments can build the tools to help organizations collect this information across the gulf and link data together for the fishing departments. Data collection can then be implemented by the cooperatives in Belize, the Red de Pescadores for Guatemala and through area specific nongovernmental organizations and fisheries departments of each country	This data base can be developed during the first half of 2012 for use when conch season starts in September 2012 and onwards
4	Increase control of national markets and trade routes	Fisheries departments, Tourism ministry, Food and health inspectors, Tourism and restaurant groups, chamber of tourism and business associations	Ongoing from September 2012
5	Control of international trade	OSPESCA, Customs, OIRSA, CITES, SEA, Fisheries departments	Ongoing from September 2012
6	Alternative livelihoods	TRIGOH, Red de Pescadores, NGOs, Fisheries Authorities, Fishers groups, Associations and Cooperatives, Ministry of tourism, cultural agencies	Conduct pilot prior to closed season of 2012 for implementation during closed season
7	Alternative fisheries	Pilot projects are underway by NGOs in Honduras and fisheries associations in Belize to trial information exchange between Rio Grande fishing cooperative and Utila cays fishers	Conduct pilot prior to closed season of 2012 for implementation during closed season
8	Monitoring conch and seagrass	Fisheries agencies and NGOs, connected through a network based around the current HRI model for cross boarder data collection and coordination	Start August 2012
9	Targeted research specifically on connectivity	Research efforts can be expanded to other marine protected areas and to Belize especially the deep water study as soon as possible providing collaboration from NGOs and the fisheries department as well as the Belize fishing cooperatives.	Pilot completed in 2012 look to expand in 2013 to 2015
10	Management committee	All stakeholders with initial catalyst to establish committee proposed to be TRIGOH	Start as soon as possible, meet every 6 months and review plan every 5 years

# COMPLIANCE AND MONITORING OF THE PLAN

Plans can be made relatively easily however, to ensure that they are implemented and the proposed actions taken can be more difficult. Firstly the responsibility for enacting this plan ultimately falls to the stakeholders of the conch fishery in the Gulf of Honduras. The ability of conch to sustain fisheries in the future cannot be taken for granted and as such it is the responsibility of each stakeholder, either as a group or as an individual, to work to ensure that there is conch for future generations.

This plan is based on the suggestions and recommendations made by the different groups which are directly and indirectly related to conch fisheries in this region. These same stakeholders need to now participate in the formation of the conch committee as per Objective 10. To facilitate this, the first step should be an existing body, such as TRIGOH or a larger NGO, taking the lead to organize and invite participants to form the committee, including representatives from each of the fishing departments. It must be clear that the responsibility for enacting this plan should not rest solely on the respective fisheries departments and instead should be spearheaded by relevant NGO and fisheries groups including for example the Gulf of Honduras fishermen's network.

For the objectives of the plan itself, enforcement is essential to ensure that the actions taken are being adhered to. The committee must think of suitable methods to monitor and control implementation. Whilst direct methods of enforcement such as patrolling and landing controls are expensive to implement, indirect methods which aim to create a document trail that can be effectively audited can be much more cost effective. By instigating documentation requirements ranging from licenses to export documents and comparing information obtained at different points during the catch to export process the implementation and compliance with the plans objectives can be assessed.

Audit-like documentation can be a powerful method to enforce rules and regulations set by decision-makers. It is also a pre-requisite for CITES for international export and so enhancing and improving these processes can also improve CITES adherence.

Improving the effectiveness of the implementation and subsequent compliance with the tri-national plan requires two actions:

Consultation: The committee must continue the consultation process across its members and with wider stakeholders to be actively incorporated in decision-making and address any concerns raised by stakeholders. If the committee and stakeholders clearly understand the problems and can fully explain the benefits or the solutions, each stakeholder may be individually and collectively more willing to accept and work to implement the objectives of the plan. In essence consultation helps stakeholders be more prepared to accept any short-term hardship in exchange for long-term benefits of sustainable resource use. This plan must therefore proceed under the banner of co-management encouraging that the implementation be devolved as much as possible to the fishers and commercial chain themselves.

Enforcement: Ensuring compliance is always necessary. When some people get away with ignoring controls, other previously law-abiding fishers or traders will see less reason for themselves to follow regulations, and management quickly deteriorates. Maintaining a positive reinforcing cycle of targeted and visual enforcement helps prevent this break down in management efficacy. Breaking regulations that are designed to sustain the fishery and include removing individuals from protected areas, or out of season, or when undersize, undermines the management process and ultimately needs to be suppressed.

Enforcement however is not just about external control. There is a need to gradually change the attitudes of communities and the market to reduce the tolerance for people breaking fishing regulations. Collectively people within a community or market can effectively enforce regulations without the need for outside controls, providing that they collectively refuse to accept poaching behavior in their spheres of influence and agree to report or sanction it.

Individual choice when taken by more and more people can make collective change through their own actions. This stretches from the moment the fisher makes a decision to collect or leave a particular conch, up to the point the consumer decides to buy or leave that same individual. This plan needs to be explained in terms of individual choices. Everyone who catches trades or eats conch has a role to play in the future of conch resources and they are all individually responsible for compliance with regulations. Building awareness about individual choices and not tolerating anti social fishing behavior (poaching a resource from the community) should be a key part of ensuring compliance.

The committee should aim to review this plan at least every five years and establish which objectives have been met, fully partially or not at all. Independent reviews, particularly of the technical components, such as the results from monitoring studies, quota levels and targeted research, will add significantly to the review and adaptation process of this plan.

Feedback processes that can suggest improvements, adapt to new situations and learn from experiences are essential to help evolve plans and keep them up

to date. The committee should aim to consult not only with the government officials and non-governmental organizations, but should include the views of fishers, the market chain, the consumer and tourism sector, and other broader stakeholders. Reacting to their concerns and including them in evolving this plan should improve the eventual management actions taken.

Ultimately confidence in the management system can be increased from effective review and an honest appraisal of the successes and failures of the plan. A fishery monitoring system as recommended in this plan will be instrumental in being able to assess and demonstrate whether the plan's overarching objectives of recuperating conch populations and improving conch fisheries are being reached.

The current plan will be submitted to the fishing authorities in each of the three countries in addition to CCAD for review. The aim is that the strategies outlined in this plan can receive official backing to facilitate their implementation in the region. In parallel to this initiative the role of civil society and key stakeholders cannot be under stated as they will be crucial to the adoption and implementation of the recommendations developed under this program.

# APPENDICES

## **Acronyms**

AGRRA	Atlantic and Gulf Rapid Reef Assessment
BICA	Bay Islands Conservation Association
CEMU	Centro de Ecología Marina de Utila (Utila Centre for Marine Ecology)
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
DIGEPESCA	Dirección General de Pesca y Acuicultura – Fisheries and Aquaculture Department (Honduras)
DIPESCA	Departamento de Manejo de la Pesca y Acuicultura - Fisheries and Aquaculture Department (Guatemala)
EEZ	Exclusive Economic Zone
GOH	Gulf of Honduras
ICF	Instituto Nacional de Conservación y Desarrollo Forestal, Areas Protegidas y Vida Silvestre – National Institute for Conservation, Forestry Development, Protected Areas and Wildlife (Honduras)
NGO	Non Governmental Organization
OIRSA	Organismo Internacional Regional de Sanidad Agropecuaria – International Organisation for Regional Agricultural Health
PMAIB	Proyecto de Manejo Ambiental de la Islas de la Bahía – Environmental Management project of the Bay Islands
SAG	Secretaria de Agricultura y Ganadería - Ministry of Agriculture and Livestock (Honduras)
TAC	Total allowable catch
TIDE	Toledo Institute for Development and Environment
TRIGOH	La Alianza Trinacional para la Conservación del Golfo de Honduras – The trinational alliance for the conservation of the Gulf of Honduras
WCS	Wildlife Conservation Society



## List of people involved in consultation process

<b>Organization</b>	<b>Position</b>	<b>Representative</b>
DIGEPESCA	Departamento de Investigación Científica / Asistente de Investigación	Jose Antonio Romero
Oficina Regional Roatán de la Dirección General de Pesca y Acuicultura DIGEPESCA	Jefe Regional Roatan	Rene Betancourt
Unidad de Manejo Ambiental Municipalidad de Omoa	Jefe de la Unidad Ambiental	Gustavo Cabrera
Unidad de Manejo Ambiental Municipalidad de Utila	Responsable de UMA	Michelle Fernández
Roatan Marine Park	Directora Ejecutiva	Grazzia Matamoros
Utila Dive Safety and Environment Council	Asesor Científico	Andrzej Narozanski
Bay Islands Conservation Association (BICA)	Asistente Tecnico	Pamela Ortega
Fundacion Cayos Cochinos	Director Ejecutivo	Adrian Oviedo
Cuerpos de Conservación de Omoa (CCO)	Director	Roger Flores
Proyecto Golfo de Honduras	Especialista Ambiental	Roberto Rivas
Asociación de Pescadores Artesanales (APESCA)	Presidente	Edgar Hyde
Asociación de Pescadores de Utila	Presidenta	Reina Yolany Asiego
Centro de acopio Utila Cays (Caracol y Langosta)	Dueño	Newton Diamond
Asociación de Pescadores de Chachaguate	Presidente	Juan Diego Calix
Federación Nacional de Pescadores Artesanales de Omoa	Presidente	Noe Chavarria
Asociación de Pescadores Artesanales (APESCA)	Presidente	Kenny McNab
Asociación de Pesca Industrial de Honduras (APICAH)	Presidente	Richard Bonilla
Representante de Empacadoras de Ceiba	Presidente	Francisco Terry
Representante de Empacadoras de Roatan	Presidente	Shawn Hyde
Flying Fish	Gerente	Russ Summerell
Mariscos Agua Azul	Gerente	Edwin Castillo
DIPESCA	Asistente técnico de pesca	Misael James
FUNDAECO-COSTAS	Sub Coordinadora Programa Marino costero	Cleopatra Méndez
FUNDAECO-COSTAS	Técnico de la organización	Justo Rodríguez
DIPESCA	Oficial de pesca	Elías Valdés
CISP	Especialista en Pesca	Juan Ramón Pocón
Fishermen	Diver	Mario Saldivar

		Hernández,
Fishermen	Diver	Erick Marín Ramirez,
Fishermen	Diver	Alberto Fúnez
Conch market chain	Main Conch merchants	Anonymous x 2
Fisheries Department of Belize	Fishers Administrator	Beverly Wade
Fisheries Department of Belize	Fisheries Officer Belize City	Mauro Gongora
Fisheries Department of Belize	Fisheries Officer Punta Gorda	Lyndon Rodney
Rio Grande Fisheries Cooperative	Representative	Armando Ramirez
Rio Grande Fisheries Cooperative	President	George Ramirez
University of Belize	Researcher	Arlenie perez
WCS	Head	Janet Gibson
TIDE	Executive Director	Celia Mahun
TIDE	Director of Science	James Foley
Southern Environmental Association	Park Manager Sapodilla Cayes	Dennis Garbutt
Anonymous	Guatemalan market stall holders	Fish sellers x 4